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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/657,107	09/09/2003	Yasushi Sasa	65326-029	9832

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EXAMINER	
LIEW, ALEX KOK SOON	
ART UNIT	PAPER NUMBER
2624	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/657,107	SASA ET AL.	
	Examiner	Art Unit	
	Alex Liew	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 September 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *09 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 – 6, 8 – 18 and 20 – 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka (US pat no 7,116,816) in view of Bamberger (US pat no 5,946,407).

With regards to claim 1, Tanaka discloses an inspection apparatus for inspecting pattern on an object, comprising

an image pickup device for performing an image pickup of an object to acquire data of an inspection image which is multitone (see fig 1 – 16),

a memory for storing data of a reference image (see fig 1 – 18 and col. 5 lines 31 – 32) and

obtaining an enhanced differential image between said inspection image and said reference image to perform an inspection on the basis of said enhanced differential image (see fig 3 – calculation of difference value obtaining difference image and col. 6 lines 58 – 67 – defects are detected using a threshold value, if the pixel value is greater than a threshold value that defects are detected).

But Tanaka does not disclose using transfer characteristics to enhance difference between arbitrary pixels among plurality of pixel values. During the pre-difference image calculation Tanaka performs alignment between the inspection image and reference in order to obtain a properly align difference image (see fig 3 – alignment), but does not perform an operation to enhance the inspection and reference image. However, Bamberger discloses using transfer characteristics to enhance difference between arbitrary pixels among plurality of pixel values (see fig 6C – E and col. 13 lines 14 – 21 – the circled dots in images from fig 6C and D are region of interest, which are read as the defect regions in an inspection electronic part, the Look up table shown in fig 6E is read as transfer characteristic with 464, 466, 468 and 470 are possible region of interest, the specified pixels are those in the dotted regions in images in fig 6 C and D). Although, Bamberger relates to scanning medical images and enhancing images, the method and apparatus disclosed on Bamberger are not limited to medical images only, it can relate to any application, which detects types of region of interest; in the current claimed invention the region of interest are the defects in images of electronic parts. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include using transfer characteristics to enhance difference between arbitrary pixels among plurality of pixel values because to increase the brightness of the regions of interest (see Bamberger fig 4B – D) allowing the defects in the differential image to appear brighter, so the operator finding the defect will find it easier.

With regards to claim 2, see the arguments in claim 1. In addition, Tanaka discloses an alignment section, aligning the inspection image and reference image, as shown in figure 3, combined with the teachings of Bamberger, which is to add another step before the alignment process, to enhance the brightness of the inspection and reference, by generating a look up table using the input image (see Bamberger col. 12 lines 23 – 28 – p(f,g) is the look up table, f is the original input image and g is the convoluted input image).

With regards to claim 3, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose transfer characteristics determined based on values of the inspection image or reference image. Bamberger discloses transfer characteristics is determined on the basis of pixel values of said inspection image or reference image (see col. 12 lines 23 – 28 – p(f,g) is the look up table, f is the original input image and g is the convoluted input image). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 4, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose plurality of specified pixel values positioned between representative pixel values corresponding to two regions. Bamberger discloses plurality of specified pixel values are positioned between representative pixel values corresponding to two regions

in said input image (see fig 6E – the two regions are areas 466 and 468, they are between region where the output of the look up table is constant). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 5, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose said representative pixel values is an average value of values of pixels belonging to a region. Bamberger discloses each of said representative pixel values is an average value of values of pixels belonging to a region (see fig 6E – convolution operations are perform to each of the circular regions before forming the look up table, see col. 12 lines 1 – 3). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 6, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose plurality of specified pixel values are positioned outside a pixel value range corresponding to a specific region in said inspection image or said reference image. Bamberger discloses said plurality of specified pixel values are positioned outside a pixel value range corresponding to a specific region in said input image (see fig 6 – the specific regions are 466 and 468, those specified pixels values are 464 and 470, which are outside the specified pixel values). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 8, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose operation part sets a specified pixel values range including said plurality of specified pixel values. Bamberger discloses said operation part sets a specified pixel values range including said plurality of specified pixel values (see fig 6C and D – the pixel specified range for specified pixel values are those in the dotted dark circular regions and fig 6 – those specified regions in 464, 466, 468, 470 and 472). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 9, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose an input part for receiving an input of a specified pixel value range including said plurality of specified pixel values. Bamberger discloses an input part for receiving an input of a specified pixel value range including said plurality of specified pixel values (see fig 6C – E – the output of the look up table shown in fig 6E is produced from the input image and the range of specified pixel values are shown in the output of the look up table, 464, 466, 468, 470 and 472). See the motivation provided by in claim 1 or combining Tanaka with Bamberger.

With regards to claim 10, see the arguments presented in claim 2. To reiterate from claim 2, by adding an addition image enhancing process, enhancing input and reference

image, before alignment process, one will achieve enhanced brightness of the image (shown in Bamberger fig 4B – C – brightness is adjusted through changing the curvature output of the look up table), so the operator will take more notice of the defects after performing the difference image.

With regards to claim 11, Tanaka discloses a defect inspection apparatus according to claim 1, wherein said operation part synthesizes a differential image between said inspection image and said reference image and said differential image and compares values of pixels in a synthesized image with a predetermined threshold value to perform inspection (see fig 3 – the threshold is specified at 25, th, the position of the pixel values which exceeds the threshold value are noted at 26).

With regards to claim 12, Tanaka discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose dividing image acquired by said image pickup part. Bamberger discloses each of a plurality of images, which are obtained by dividing an image acquired by said image pickup part is said input image (see fig 4B – D – shows regions where there is a chance it is a cancer tumor region, those cancer tumor regions are read as defects in an inspection electronic part because it is brighter than the rest of the image, only a divided section of the image is taken and enhance by a look up table shown in fig 4D, the images being examine are input images, see fig 1 – 10). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include

dividing image acquired by said image pickup part because to avoid increasing the brightness of the entire image causing the brightness of noise pixels to be enhance, which will negatively effect the results of the defect detection system.

With regards to claim 13, see the rationale and rejection for claim 1.

With regards to claim 14, see the rationale and rejection for claim 2.

With regards to claim 15, see the rationale and rejection for claim 3.

With regards to claim 16, see the rationale and rejection for claim 4.

With regards to claim 17, see the rationale and rejection for claim 5.

With regards to claim 18, see the rationale and rejection for claim 6.

With regards to claim 20, see the rationale and rejection for claim 8.

With regards to claim 21, see the rationale and rejection for claim 10.

With regards to claim 22, see the rationale and rejection for claim 11.

With regards to claim 23, see the rationale and rejection for claim 12.

With regards to claim 24, see the rationale and rejection for claim 1.

2. Claims 7 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tanaka ('816) in view of Bamberger ('407) as applied to claims 6 and 18 further in view of De Gasperi (US pat no 4,433,385).

With regards to claim 7, Tanaka and Bamberger disclose all of the claim elements / features as discussed above in rejection for claim 6 and incorporated herein by reference, but fails to disclose calculating standard deviation within specified area. Bamberger calculates the average value of the specific pixel values (see col. 12 lines 1 – 3), but does not further calculate the standard deviation of the specific pixel values. De Gasperi discloses a defect inspection apparatus according to claim 6, wherein said pixel value range corresponding to said specific region is set on the basis of a standard deviation of values of pixels belonging to said specific region (see col. 5 lines 15 – 35 – device calculates the standard deviation of a 16-dotted area). It would have been obvious to one having ordinary skill in the art at the time of the invention was made to include calculating standard deviation within specified area because the standard deviation finds areas, which are uniformly distributed (see De Gasperi col. 6 lines 55 – 60), in the case of defects, one will be able to obtain the type of defects by calculating the standard deviation to see whether the defect is uniform or if it is not uniform (eg. half

of the defect area is deeper than the other half), then one will be able to classified or recognize the type defect present on the electronic device to select the proper procedure to correct the defect on the electronic part.

With regards to claim 19, see the rejection for claim 7.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alex Liew whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Mancuso can be reached on (571)272-7695. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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1/15/07

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SUPERVISORY PATENT EXAMINER